WE CLAIM:

1. A system for measuring optical characteristics of an optical device under test (DUT), said system comprising:

a light source for generating an optical signal applied to the optical DUT;

a reference interferometer and a test interferometer, said interferometers being optically coupled to said light source; and

a computing unit coupled to said interferometers, said computing unit utilizing amplitude and phase computational components to aid in the determination of optical characteristics of the optical DUT.

2. The system according to claim 1, wherein the amplitude and phase computational components are orthogonal filters.

3. The system according to claim 1, wherein the optical characteristics include at least one of the following:

a reflective transfer function,

a transmissive transfer function, and

group delay.

4. The system according to claim 1, wherein said light source is a tunable laser source.

5. The system according to claim 1, wherein the computing unit further computes an amplitude and a phase of a heterodyne beat signal produced by said test interferometer.

6. The system according to claim 1, wherein said reference interferometer is non-dispersive or dispersion compensated.

7. The system according to claim 1, wherein the orthogonal filters are applied to a signal produced by at least one of the test or reference interferometers.

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~~8. The system according to claim 7, wherein said computing unit includes:~~

~~a first computing unit computing at least one of phase and amplitude of a heterodyne beat signal produced by said reference interferometer,~~

~~a second computing device computing phase and amplitude of a heterodyne beat signal produced by said test interferometer, and~~

~~a third interferometer computing the group delay based on the phase computations of the first and second interferometers.~~

9. The system according to claim 1, wherein the orthogonal filters are performed by at least one of the following:

in-phase and quadrature filters in the time domain,

in-phase and quadrature filters in the frequency domain,

a single sided filter, and

an all-pass filter using a Hilbert transform.

10. A method for measuring optical characteristics of an optical device under test (DUT), said method comprising:

generating a light signal;

transmitting the light signal on an optical test interferometer;

receiving a reference signal and a test optical signal, the reference optical signal being generated by test interferometer; and

computing the optical characteristics of the optical DUT by utilizing at least one amplitude and phase computational component.

11. The method according to claim 10, wherein the amplitude and phase computation component is a pair of orthogonal filters.

12. The method according to claim 10, wherein the optical characteristics include at least one of the following:

a reflective transfer function,

a transmissive transfer function, and

group delay.

13. The method according to claim 10, wherein the reference and test signals are heterodyne beat signals.

14. The method according to claim 10, wherein the light source is a tunable laser source.

15. The method according to claim 10, wherein said computing the optical characteristics further includes computing amplitude and phase of at least one heterodyne beat signal.

16. The method according to claim 10, wherein the reference interferometer signal is non-dispersive or compensated for dispersion.

17. A system for measuring optical characteristics of an optical component, said system comprising:

means for illuminating the optical component with an optical signal;

first means for determining an optical frequency of the optical signal generated by said means for illuminating;

second means for determining amplitude and phase of the optical signal generated by said means for illuminating and in response to illumination of the optical component, said second means including orthogonal filters; and

means for computing optical characteristics of the optical component utilizing the phase of the optical signal generated by said means for illuminating and the amplitude and phase of the optical signal in response to illumination of the optical component.

18. A method for measuring optical characteristics of an optical device under test (DUT), comprising:

generating an input optical signal having a time-varying frequency;

illuminating the optical DUT with the input optical signal;

measuring a heterodyne beat signal generated in response to the optical DUT being illuminated by the input optical signal;

computing amplitude and phase of the heterodyne beat signal using orthogonal filters;

detecting a reference phase of the input optical signal; and

computing the optical characteristics based on the amplitude and phase of the heterodyne beat signal and the reference phase of the input optical signal.

19. The method according to claim 18, wherein the response of the input optical signal from the optical DUT is at least one of a reflection or a transmission response.

20. The method according to claim 18, wherein the reference phase of the input optical signal is used to compute an optical frequency of the input optical signal.

21. The method according to claim 18, wherein the optical frequency is used to determine a true optical frequency scale.

22. The method according to claim 21, further comprising displaying the optical characteristics of the optical DUT on the true optical frequency scale.

23. The method according to claim 18, wherein the orthogonal filters are performed by at least one of the following:

an in-phase and quadrature filter in the time domain,

an in-phase and quadrature filter in the frequency domain,

a single sided filter, and

an all-pass filter using a Hilbert transform.

24. The method according to claim 18, wherein the optical characteristics include at least one of the following:

a transmissive transfer function,

a reflective transfer function, and

group delay.

25. The method according to claim 24, wherein the computation of the group delay includes at least one of the following operations:

subtraction of the reference phase from the phase of the heterodyne beat signal, and

division of the phase of the heterodyne signal by the reference phase.

26. A system for measuring optical characteristics of an optical device under test (DUT), comprising:

a light source that generates an input optical signal having a time-varying frequency;

a test interferometer optically coupled to said light source to receive the input optical signal, said test interferometer including the optical DUT;

a first optical detector optically coupled to said test interferometer to receive a heterodyne beat signal from said test interferometer; and

a processing unit coupled to said optical detector, and configured to calculate the optical characteristics of the DUT utilizing orthogonal filters.

27. The system according to claim 25, further comprising an optical frequency counter coupled to said light source.

28. The system according to claim 26, wherein said optical frequency counter is a reference interferometer.

29. The system according to claim 26, further comprising a second optical detector optically coupled to said reference interferometer to receive a heterodyne beat signal from said reference interferometer.